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Our Case No. 9281-4721
Client's Reference No. J US02173

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Hideaki Nagakubo

Serial No. 10/717,345

Filing Date: November 19, 2003

For: BACKLIGHT UNIT AND LIQUID
CRYSTAL DISPLAY DEVICE

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) Examiner: Thomas M. Sember
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) Group Art Unit No. 2875
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RESPONSE TO FINAL OFFICE ACTION

Commissioner for Patents
Alexandria, VA 22313-1450

Dear Sir:

The Applicant submits that the amendments set forth herein will place their claims in condition for allowance and respectfully request entry of the amendments.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

Amendments to the Claims

Please amend the Claims as follows:

1. (Currently Amended) A backlight unit, comprising:

a light source;

a light guide plate for introducing light emitted from the light source from an incidence surface provided on an end and emitting the light from an emission surface of the light guide plate;

a diffusive reflector disposed to face a second surface of the light guide plate opposite to the emission surface of the light guide plate; and

an air space ~~or adhesion layer~~ disposed between the light guide plate and the diffusive reflector, wherein the diffusive reflector is provided such that a minute concave~~o~~-convex portion having a light reflection property is formed on a surface of a base thereof and that the surface having the minute concave~~o~~-convex portion faces the second surface opposite to the emission surface of the light guide plate,

wherein the depths of the concave portions are randomly formed in the range of 0.1 μ m to 3 μ m and the pitches between the adjacent concave portions are randomly set in the range of 5 μ m and 100 μ m, and

wherein tilt angles inside the concave portions are set in the range of -18° to +18°.

2. (Previously Presented) The backlight unit according to claim 1,

wherein a light directivity control sheet, in which a plurality of pyramid-shaped objects is formed on a base, is provided on the first surface of the light guide plate such that apexes of the pyramid-shaped objects face an opposite side to the light guide plate, and

wherein the light directivity control sheet controls directivity of transmissive light components of at least two other directions of the light components that are emitted from the first surface of the light guide plate and pass through the light directivity control sheet.

3. (Previously Presented) The backlight unit according to claim 2,
wherein a light diffusive sheet is provided on a surface of the light directivity control sheet where a plurality of pyramid-shaped objects is formed.

4. (Currently Amended) The backlight unit according to claim 2,
wherein a minute ~~concave~~concave-convex portion having light diffusion property is formed on a surface of the light directivity control sheet opposite to the light guide plate.

5. (Previously Presented) The backlight unit according to claim 1,
wherein a thickness of a side far from the light source in the light guide plate is smaller than a thickness of a side close to the light source.

6. (Previously Presented) The backlight unit according to claim 1,
wherein the light source comprises an intermediate light guide object provided along the end of the light guide plate and a point light source provided along a longitudinal end of the intermediate light guide object.

7. (Previously Presented) A liquid crystal display device comprising the backlight unit according to claim 1 and a liquid crystal display unit illuminated by the backlight unit from a rear side.

8. (Currently Amended) A backlight unit, comprising:
a light source;
a light guide plate emitting light from the light source from an emission surface of the light guide plate;
a diffusive reflector disposed to face a second surface of the light guide plate opposite to the emission surface, the diffusive reflector comprising a plurality of light diffusing ~~concave~~concave-convex portions, the depths of the concave portions are randomly formed in the range of 0.1 μ m to 3 μ m and the pitches between the adjacent concave

portions are randomly set in the range of 5 μ m and 100 μ m, and tilt angles inside the concave portions are set in the range of -18° to +18°; and
an air space layer disposed between the light guide plate and the diffusive reflector.

9. (Previously Presented) The backlight unit according to claim 8, further comprising an air space or adhesion layer disposed between the light guide plate and the diffusive reflector.

10. (Previously Presented) The backlight unit of claim 8, further comprising a light directivity control sheet comprising a plurality of pyramid-shaped objects disposed on a base thereof, the plurality of pyramid-shaped objects facing away from the light guide plate; and

wherein the light directivity control sheet controls directivity of transmissive light components of at least two other directions of the light components that are emitted from the emission surface of the light guide plate and that pass through the light directivity control sheet.

11. (Previously Presented) The backlight unit according to claim 10, wherein the plurality of pyramid-shaped objects comprise discontinuously spaced apex portions directed away from the light guide plate.

12. (Previously Presented) The backlight unit according to claim 10, wherein the pyramid shaped objects are shaped in the form of a member selected from the group consisting of quadrangular pyramid, hexangular pyramid, octangular pyramid, cone and elliptic cone.

13. (Previously Presented) The backlight unit according to claim 10, further comprising a light diffusive sheet disposed over the light directivity control sheet.

14. (Currently Amended) The backlight unit according to claim 13, wherein the light diffusive sheet comprises ~~concave~~concave-convex portions diffusing light emitted from the emission surface of the light guide plate.

15. (Currently Amended) The backlight unit according to claim 10, wherein the light diffusing ~~concave~~concave-convex portions are disposed on a surface of the light directivity control sheet facing the light guide plate.

16. (Previously Presented) The backlight unit according to claim 8, further comprising a first prism sheet and a second prism sheet disposed over the emission surface of the light guide plate, wherein a cross section of each prism sheet comprises triangular shaped protrusions separated by wedge shaped grooves.

17. (Previously Presented) The backlight unit according to claim 16, wherein the first prism sheet and the second prism sheet are arranged so that edge lines corresponding to the triangular shaped protrusions in a first prism sheet are perpendicular to edge lines corresponding to the triangular shaped protrusions in a second prism sheet.

18. (Previously Presented) The backlight unit according to claim 8, wherein a thickness of the light guide plate decreases with increasing distance from the light source.

19. (Previously Presented) The backlight unit according to claim 8, wherein the light source comprises an intermediate light guide object provided along the end of the light guide plate and a point light source provided along a longitudinal end of the intermediate light guide object.

20. (Previously Presented) A liquid crystal display device comprising the backlight unit according to claim 8, wherein the liquid crystal display unit is illuminated by the backlight unit from a rear side.

REMARKS

Pursuant to 37 C.F.R. § 1.111, Applicant respectfully requests reconsideration of the claim rejections and objections set forth in the Office Action dated April 19, 2006.

Summary

Claims 1, 4, 8 and 14 -15 were amended. No new matter was added as a result of these amendments.

Claims 1 – 20 are pending.

Claim Objections

Claims 1 – 20 were objected to because of minor informalities. Applicant has amended “concavo-convex” to “concave-convex” throughout the claims. Applicant therefore respectfully requests that the Examiner withdraw the claim objections.

Claim Rejections

Claims 1 – 20 were rejected pursuant to 35 U.S.C. § 102(b) as being anticipated by Hira et al. (U.S. Patent No. 5,961,198; “Hira”). Claim 1 recites, *inter alia*, the depths of the concave portions are randomly formed in the range of 0.1µm to 3µm and the pitches between the adjacent concave portions are randomly set in the range of 5µm and 100µm, and tilt angles inside the concave portions are set in the range of -18° to +18°.

Hira fails to disclose or suggest at least multiple features of Claim 1. More specifically, Hira fails to disclose or teach the pitches between the adjacent concave portions recited in Claim 1. Hira also discloses an arrangement that is in contrast to the arrangement of Claim 1. Hira discloses an “inclination angle θ ” that falls “within a range of 20° to 60° and more preferably within a range of 35° ± 10°.” (Column 9, Lines 39 – 42). The arrangement fails to disclose tilt angles inside the concave portions are set in the range of -18° to +18°. Accordingly, Claim 1 is allowable over the cited art.

Dependent Claims 2 - 7 depend from an allowable base claim and are allowable for at least this reason.

Independent Claim 8 recites, *inter alia*, the depths of the concave portions are randomly formed in the range of 0.1 μ m to 3 μ m and the pitches between the adjacent concave portions are randomly set in the range of 5 μ m and 100 μ m, and tilt angles inside the concave portions are set in the range of -18° to +18°. These are the same distinguishable features that were discussed above in regards to Claim 1. Accordingly, Claim 8 is allowable for at least the same reasons as stated above.

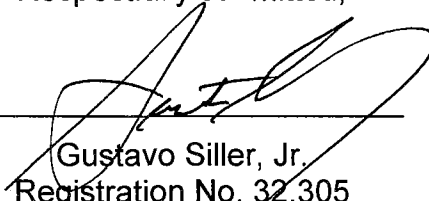
Dependent Claims 9 – 20 depend from an allowable base claim and are allowable for at least this reason.

Conclusion

For at least the reasons presented above, the Applicant respectfully submits that the pending claims are in condition for allowance.

The Examiner is respectfully requested to contact the undersigned in the event that a telephone interview would expedite consideration of the application.

Respectfully submitted,



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